

BEST AVAILABLE COPY**Docket No: F0556****Serial No. 09/824,933****REMARKS**

Claims 1-15 and 21-25 are pending in the application.

Applicant notes with appreciation the allowance of claims 1, 2, 5-9, 11-15 and 21-24. Applicants respond herein under 37 CFR 1.116 to the final Office Action mailed 07 September 2004.

Claims 3, 4, 10 and 25 have been objected to in the Office Action to which the present Reply is responsive. Applicant respectfully traverses these objections. Based on the present Reply, Applicant respectfully requests reconsideration and withdrawal of the objections to Applicant's claims 3, 4, 10 and 25, and passage of all the claims in the present application to allowance and issue.

OBJECTION TO CLAIMS 3, 4, 10 AND 25

In the Office Action, claims 3, 4, 10 and 25 are objected to based on the Office's contention that "helium, neon, argon, krypton and xenon" are not considered as dopant materials in semiconductor devices." The Office "requires" correction and omission of these terms.

Applicant respectfully traverses the objection to these terms and respectfully declines to amend the claims as requested. This "requirement" on the part of the Office is based on the apparent failure of the Office to understand and/or accord Applicant's clear definition of the terms as disclosed in Applicant's specification and claims.

As Applicant's undersigned attorney explained to the Examiner during the telephone interview of 01 September 2004 (see Interview Summary, below), the term "dopant" is not used as something added to another material such as silicon to change its electrical conductivity or other electrical properties. Rather, as is clear from a reading of Applicant's specification, the term "dopant" is used in the more general sense of a material added in small or trace amounts to alter or to obtain desired properties of the material. This definition includes the more specific definition contended by the Office, as well as the broader definition as used in Applicant's specification. Specifically, as set forth in the specification and as explained by Applicant's

Docket No: F0556**Serial No. 09/824,933**

undersigned attorney during the above-mentioned interview, in the present invention, the dopant is a material added to a substrate to create the disclosed and claimed gettering sites. By adding the claimed dopant materials, the crystal lattice of the substrate is partially disrupted, creating the gettering sites.

Claim language defines claim scope. *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121, 227 USPQ 577, 586(Fed. Cir. 1985) (*en banc*). As a general rule, claim language carries the ordinary meaning of the words in their normal usage in the field of invention. *Toro Co. v. White Consol. Indus.*, 199 F.3d 1295, 1299, 53 USPQ2d 1065, 1067(Fed. Cir. 1999). Nevertheless, the inventor may act as his own lexicographer and use the specification to supply implicitly or explicitly new meanings for terms. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979-80, 34 USPQ2d 1321, 1330 (Fed. Cir. 1995) (*en banc*), citing *In re Vogel*, 422 F.2d 438, 441, 164 USPQ 619, 621 (CCPA 1970) ("Occasionally the disclosure will serve as a dictionary for terms appearing in the claims, and in such instances the disclosure may be used in interpreting the coverage of the claim."). Even when guidance is not provided in explicit definitional format, "the specification may define claim terms 'by implication' such that the meaning may be 'found in or ascertained by a reading of the patent documents.'" *Bell Atl. Network Servs., Inc. v. Covad Communications Group, Inc.*, 262 F.2d 1258, 1268, 59 USPQ2D 1865, 1870-71 (Fed. Cir. 2001). That is, a claim term may be clearly redefined without an explicit statement of redefinition in the specification. *Id.* at 1870.

Applicant respectfully submits that the Office is incorrectly taking the position that the term "dopant" must be given its "normal" usage in the semiconductor field, that is, as a material added to change the electrical conductivity of a material such as silicon. The Office's position is in contravention to the clear definition and usage in Applicant's specification. In the present application, Applicant has acted as his own lexicographer and has used the specification to supply a broader meaning for the term "dopant" than that contended by the Office. This is entirely proper and accords with the law as enunciated by both the Federal Circuit and the CCPA.

Docket No: F0556**Serial No. 09/824,933**

Applicant's claim 1 recites a step of "forming at least one gettering plug in each said cavity, each said gettering plug comprising doped fill material containing a plurality of gettering sites". Applicant's claim 9 recites a step of "adding at least one dopant to the fill material to form at least one gettering plug including a plurality of gettering sites". Applicant's claim 21 recites a step of "implanting at least one dopant into the fill material in the cavities to form at least one gettering plug including a plurality of gettering sites". Thus, in each of Applicant's allowed independent claims, a "dopant" is added to the material forming the gettering plugs, thus to form a plurality of gettering sites.

Applicant submits herewith a copy of the definition of "dope" from Hawley's Condensed Chemical Dictionary (12th Ed., 1993), which defines "dope", the root word for "dopant", at page 443 in pertinent part as:

(3) A trace impurity introduced into ultrapure crystals to obtain desired physical properties, especially electrical properties.

This definition accords with both Applicant's broader definition and the Office's more narrow definition of "dopant".

In the present application, the desired physical characteristic is the ability of the doped material to act as a gettering plug. Referring to an embodiment where the trench fill material is polysilicon, as disclosed in the specification from page 11, line 30 to page 12, line 3:

As described below, including dopant ions in the polysilicon results in the formation of better gettering sites, into which gettered impurities not only migrate, but which also more effectively trap the impurities. Ordinary polysilicon, even stressed polysilicon, does not trap impurities as effectively as does the doped polysilicon of the present invention.

Thus, the property of trapping impurities in gettering sites is the desired physical property obtained by the dopants added to the plug fill material in the present invention. The dopant is not added for the purpose of altering the electrical properties, contrary to the more narrow use of the term "dopant" advanced by the Office.

Docket No: F0556**Serial No. 09/824,933**

As set forth in the specification, for example, at page 6, lines 26-27:

The gettering plug 108 may be formed of a suitable fill material, e.g., polysilicon, doped with at least one dopant to form a plurality of gettering sites.

Thus, the "dopant" is the material added to the fill material to form the gettering sites. As shown by this sentence, the dopant is not added to the fill material for the purpose of changing the electrical conductivity of the fill material. Rather, the dopant is added to form the plurality of gettering sites. This is stated again, for example, at page 12, lines 16-22:

The dopants which may be co-deposited with the polysilicon, i.e., by LPCVD, include phosphorus, arsenic, antimony, bismuth, boron, aluminum, gallium, indium, and germanium. These dopants may be co-deposited by providing a source of such dopants together with a source of silicon for the polysilicon. For example, when the dopant is phosphorus, a material such as phosphine (PH_3) may be provided to the deposition apparatus along with a source of silicon such as silane (SiH_4). Any suitable source of such dopants known in the art may be employed.

In another embodiment of the presently disclosed and claimed invention, the dopant is implanted into the previously-filled trench to form a gettering plug containing a plurality of gettering sites. This is defined, for example, at page 12, lines 23-27:

In an alternative cavity filling step, in a first deposition step, shown as step S1003 in Fig. 10, the cavity 120A is filled with a fill material such as polysilicon to form the non-doped fill material 124. In a second step, shown as step S1004 in Fig. 10, dopant ions are implanted into the fill material 124, thereby to form the doped fill material 122, including a plurality of gettering sites in the nascent gettering plug.

This definition is followed at page 13, lines 24-26, by a list of dopants which may be implanted:

The at least one dopant implanted in the step S1004 may be one or more of phosphorus, arsenic, antimony, bismuth, boron, aluminum, gallium, indium, helium, neon, argon, krypton, xenon and germanium.

Docket No: F0556**Serial No. 09/824,933**

The dopant and its function in the present invention is further defined at page 14, lines 18-20:

Whether the dopant is formed by co-deposition with the fill material, or is implanted subsequent to deposition of the fill material, the amount of the dopant should be sufficient to obtain the number and distribution of gettering sites desired.

Based on the disclosure of the specification as a whole, as exemplified by the foregoing, it is clear and beyond cavil that Applicant's use of the term "dopant" has been fully defined in the specification and that it must be interpreted to include all of the dopant materials set forth in both the specification and in claims 3, 4, 10 and 25.

Accordingly, Applicant respectfully requests the Office to withdraw the objection to claims 3, 4, 10 and 25 and to pass the application, including all of the presently pending claims, to allowance and issue.

APPLICANT'S STATEMENT OF SUBSTANCE OF TELEPHONE INTERVIEW

As stated in the Interview Summary included with the Office Action to which this Reply is responsive, on 01 September 2004, Examiner Nguyen telephoned Applicant's undersigned attorney. Claims 3, 10 and 25 were discussed. The Examiner stated the same objection as that set forth in the Office Action to which this Reply is responsive and in the Interview Summary. That is, the Examiner objected to the definition of the term dopant as used in the claims 3, 10 and 25 to include the noble gas elements recited in those claims. In response, Applicant's undersigned attorney argued substantially along the same lines as set forth in the present Reply to Office Action. Agreement was not reached in the interview. Applicant's undersigned attorney during the interview refused to agree to the amendment of claims 3, 10 and 25 as "required" by the Examiner, substantially as set forth in the present paper and for the same reasons.

The foregoing constitutes Applicant's statement of the substance of the Examiner-initiated interview of 01 September 2004 in accordance with MPEP 713.04.

Docket No: F0556Serial No. 09/824,933**CONCLUSION**

Applicant respectfully submits that for at least the foregoing reasons, the claim terms are clear and in accordance with 35 U.S.C. 112, first and second paragraphs and, as such, the terms used in the claims are defined in the specification such that a person of ordinary skill in the art would easily understand them and so are not objectionable. Accordingly, Applicant respectfully requests the Examiner to reconsider and withdraw the objection to Applicant's claims 3, 4, 10 and 25 on the basis contended in the Office Action, and to indicate that these claims, together with the remaining claims 1, 2, 5-9, 11-15 and 21-24 are allowed. Accordingly, Notice of Allowance is respectfully requested.

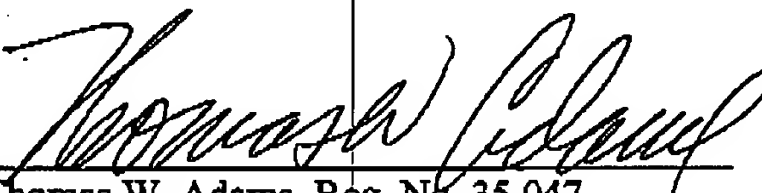
In the event issues remain in the prosecution of this application, Applicant requests that the Examiner telephone the undersigned attorney to expedite allowance of the application. Should a Petition for Extension of Time be necessary for the present Reply to the outstanding Office action to be timely filed (or if such a petition has been made and an additional extension is necessary) petition therefor is hereby made and, if any additional fees are required for the filing of this paper, the Commissioner is authorized to charge those fees to Deposit Account #18-0988, Docket No. F0556.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP

DATE: September 20, 2004

1621 Euclid Avenue
Nineteenth Floor
Cleveland, Ohio 44115
Ph: (216) 621-1113
Fax: (216) 621-6165


Thomas W. Adams, Reg. No. 35,047

B:\Adams-Tom\Client Files\AMD\448-F0556\amd448-ROA6af.wpd